

REMARKS

Claims 1, 3-25 are now pending in the application. Claims 1-25 stand rejected. Claim 2 has been cancelled herein, and Claims 1, 3-21, 23-25 have been amended. Support for the amendments can be found throughout the application, drawings and claims as originally filed and, as such, no new matter has been presented. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REQUIREMENT FOR INFORMATION

The Office has requested that Applicant provide information to document the level of skill and knowledge in the art of automatic image registration as this information is determined to be reasonable and necessary to the examination of this application. In this regard, Applicant refers the Office to Table 1, below.

Table 1

| Claim Subject Matter | Citation | Improvements of Present Application |
|---|--|---|
| Claim 1. | | |
| generating a sensor image of a first scene with a sensor mounted on a platform the sensor image including a geocoded surface model of the first scene; | -- generating ... Neff, claim 1 and Col 9, line 12-14. Test [sensor] image is captured with synthetic aperture radar. | -- generating ... The correct perspective match image is geocoded. This is possible because both the 3-D surface image acquired by the sensor and the reference image are both geocoded. When the projection is performed using this geocoded data, each pixel projected to the perspective match image carries its geocode coordinate values, which are assigned as the 3-D geocoding coordinates of the pixel to which it is projected. The more accurate match between the sensor image and the perspective match image obtained by using the registered 3-D surface allows these coordinates to be accurately transferred. |
| accessing a geocoded reference image of a second scene, said reference image encompassing said sensor image; | -- accessing ... Neff, fig.1 "template". Apparatus include means for storing template [2nd image]. | -- accessing ... Template store is entire reference image in Neff. Reference in the present application is much larger, and requires a small portion be selected, accessed, extracted from storage, during use. |
| identifying the portion of the geocoded reference image depicted in the sensor image; | -- identifying ... Neff, fig.7. Determine labels [features] in reference image that are present in sensor image. | -- identifying ... Locating anything in a ref. image, such as "labels" or features or any other entities or points, clearly implicitly defines an area in the reference image. The present application defines an area directly (the "sensor footprint"), from information about where the sensor is pointing, and does not require information about any entities in the sensor image, such as "labels", etc. |
| defining an area of the geocoded reference image based on said geocoded reference image portion; and | -- defining ... Neff, fig.7. reference area defined based on reference image portion identified with labels. | -- defining ... The present application converts the sensor footprint definition into a specification of a portion of the reference image, and of the DEM, to retrieve, from the extensive data base of reference images and DEM. |

| | | |
|---|---|--|
| conforming said geocoded surface model of the sensor image and said geocoded reference image area to a common perspective by transforming the perspective of at least one of said sensed image and said geocoded reference image area, and | --conforming... Neff, Col 16, line 16-57. "The test image and ref. image from which the template is constructed are oftentimes obtained from different viewpoints, such as from different angles and/or from different directions. In order to at least partially compensate for the differences between the first and second viewpoints, the image processor which forms the template generator means can geometrically warp the template." | --conforming... The present application invokes a much stronger approach, to remove most of the viewpoint differences, by using better and more complete information in a geocoded 3-D DEM data base which provides for arbitrary scene areas that have not been pre-planned and manually prepared as is the case in Neff, Col 2, line 22-44. |
| matching said images of common perspective. | --matching... Neff, title and abstract. Image processing method matches (correlates) the test image with the template. | --matching... Greater conforming of viewpoint is achieved in the present application. |

With further regard to the Office's request for specific improvements of the subject matter in Claims 1-25 over the cited art, Applicant also respectfully refers the Office to paragraphs [0010]-[0023] of the specification as filed. In addition, Applicant respectfully refers the Office to the remarks contained below for a discussion of the specific elements in the claimed subject matter that provides these improvements over the cited art.

DRAWINGS

The drawings stand objected to for failing to show the methods of Claims 1-25. Applicant respectfully disagrees. With reference to Fig. 5, Fig. 5 discloses each operation in the methods of Claims 1-25, as discussed with reference to paragraphs [0104]-[0106] of

the specification. Therefore, Applicant respectfully requests the reconsideration and withdrawal of the objection to the drawings.

REJECTION UNDER 35 U.S.C. § 112

Claims 3, 7-9, 16, 17 and 21-23 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Claims 3 and 17 have been amended to overcome this rejection, and support for this amendment can be found in at least paragraph [0037] and [0043] of the specification as filed. Claims 7 and 21 have been amended to overcome this rejection, and support for this amendment can be found in at least paragraph [0044] of the specification as filed. With regard to Claims 8 and 22, enablement for Claims 8 and 22 can be found in at least paragraphs [0073]-[0102], and paragraphs [0106]-[0111] of the specification as filed. Enablement for Claims 9, 16 and 23 can be found in at least paragraph [0048], and paragraphs [0102]-[0106] of the specification as filed. Accordingly, as one of ordinary skill in the art would be enabled to make and use the claimed subject matter of Claims 3, 7-9, 16, 17 and 21-23 based on the specification as filed, Applicant respectfully requests that the Office reconsider and withdraw the rejection of Claims 3, 7-9, 16, 17 and 21-23 under 35 U.S.C. § 112, first paragraph.

Claims 3, 5, 12, 17 and 21 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant has amended Claims 2, 5, 12, 17 and 21 to overcome this rejection. Therefore, reconsideration and withdrawal of this rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 102

Claims 1-4, 8, 10-11, 13-15, 17-18, 22 and 24-25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Neff et al. (U.S. Pat. No. 5,809,171; hereinafter "Neff"). This rejection is respectfully traversed.

Initially, Applicant notes Neff appears to pursue registration to locate a single point in the sensor image. It is only that point that is to be located. By determining the offset shift needed to align (register) that single point in the sensor image with the single match point in the reference image, a guidance datum is obtained. Applicant notes, however, that while a geographic location is estimated for that one point in the sensor image, based on its match offset from the selected point in the reference image, no other points in either image are associated with geographic location information. In contrast, independent Claim 1 has been amended to recite:

...generating a sensor image of a first scene with a sensor mounted on a platform, the **sensor image including a geocoded surface model** of the first scene;
accessing a geocoded reference image of a second scene, said geocoded reference image encompassing said sensor image;
identifying the portion of the geocoded reference image depicted in the sensor image;
defining an area of the geocoded reference image based on said geocoded reference image portion; and
conforming said **geocoded surface model of the sensor image and said geocoded reference image area to a common perspective** by transforming the perspective of at least one of said sensed image and said geocoded reference image area, and matching said images of common perspective (emphasis added).

Independent Claim 13 has been amended to recite:

...generating a first image of a first scene, the **first image having a coordinate system associated therewith**;

generating a second image of a second scene, said second image encompassing said first image, the **second image having the coordinate system associated therewith**;

defining at least a portion of said second image depicting at least a portion of said first image;

conforming said first and second image portions to a common perspective, **using the coordinate system** ...(emphasis added).

In view of the above discussion, Applicant respectfully asserts that Neff does not teach, suggest or disclose each and every element of at least Claims 1 and 13. In this regard, Neff does not teach, suggest or disclose generating a sensor image of a first scene that includes a **geocoded surface model of the first scene** and accessing a **geocoded reference image of a second scene** that encompasses the sensor image as claimed. Neff also does not teach, suggest or disclose generating a first image having a coordinate system associated therewith and generating a second image having a coordinate system associated therewith. Rather, at best, Neff appears to disclose estimating a geographic location for one point in a sensor image, which is not equivalent to generating a sensor image of a first scene that includes a geocoded surface model of the first scene. Furthermore, as none of the other points in either the sensor image or the reference image of Neff are associated with coordinate information, neither the sensor image nor the reference image comprise coordinate based images, or are geocoded as claimed.

Applicant further notes that it would be improper to modify Neff to include the use of geocoded or coordinate based images as Neff does not provide an apparent reason to make this modification. Furthermore, none of the cited art teaches the use of a geocoded or coordinate based sensor image and reference image for use with image

registration. In this regard, Bell pursues registration of two images to be able to relate points in one image to points in the other image. Neither image is expected to be geocoded, that is, there are not expected to be geographic locations associated with any of the pixels in either image. Applicant also notes that it would not be obvious to modify Bell to include geocoded images as Bell teaches registering patches from the two images, one patch from each image, to obtain a single point in each image which can be said to be of the same location in the scene portrayed in the images. Such points are called conjugate points. An array of such patches is used by Bell to establish an array of **conjugate points**, which can then be used in a statistical adjustment process to improve the accuracy of the sensor model parameters.

Bell correlates each pair of patches, one patch from each image, to establish a symbolic relationship between two points or pixel locations, one in each image. The purpose of the patch correlation is essentially the same as the purpose of Neff, **except Bell does not seek to obtain a geographic location for the point in either image**, because the geographic location of the point is **not known** for either image.

Thus, Bell is correlating two patches that share only an approximately common perspective. This causes inaccuracy in the point matching for each point. Then only the statistical process of using the entire set of matched points to estimate the correct sensor model parameters is able to reduce the inaccuracy of individual point matching, often times by detecting and removing individual point matchings that show unacceptably large residual error when taken in concert of the full set of points.

Accordingly, in view of at least the above discussion, Applicant respectfully submits that the cited art does not teach, suggest or disclose each and every element of

Claims 1 and 13, and thus, Applicant respectfully requests the Office to reconsider and withdraw the rejection of Claims 1 and 13 under 35 U.S.C. § 102(b). In addition, since Claims 3, 4, 8, 10, 11, 14, 15, 17, 18, 22, 24 and 25 depend directly or indirectly from either independent Claim 1 or 13, Claims 3, 4, 8, 10, 11, 14, 15, 17, 18, 22, 24 and 25 should be in condition for allowance for at least the reasons set forth for Claims 1 and 13 above. Accordingly, Applicant respectfully requests the Office reconsider and withdraw the rejections of Claims 3, 4, 8, 10, 11, 14, 15, 17, 18, 22, 24 and 25 under 35 U.S.C. § 102(b).

REJECTION UNDER 35 U.S.C. § 103

Claims 5-7, 9, 16, 19-21 and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Neff in view of Bell et al. (U.S. Pat. No. 5,550,937; hereinafter "Bell"). Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Neff in view of Bell, and further in view of common knowledge in the art. This rejection is respectfully traversed.

Applicant respectfully refers the Office to the remarks regarding Claims 1-4, 8, 10-11, 13-15, 17-18, 22 and 24-25 for a discussion of the Neff reference and the Bell reference. As discussed, Applicant respectfully asserts that neither Neff nor Bell, singly or in combination, teach, suggest or disclose each and every element of Applicant's claims. Further, with regard to Claims 5-7, 9, 12, 16, 19-21 and 23, Applicant notes these claims depend directly or indirectly from either independent Claim 1 or 13, and thus, Claims 5-7, 9, 12, 16, 19-21 and 23 should be in condition for allowance for at least the reasons set forth for Claims 1 and 13 above. Accordingly, Applicant

respectfully requests the Office reconsider and withdraw the rejections of Claims 5-7, 9, 12, 16, 19-21 and 23 under 35 U.S.C. § 103(a).

DOUBLE PATENTING REJECTION

Claims 1-7 stand provisionally rejected under 35 U.S.C. § 101 as claiming the same invention as that of Claims 14-20 of copending Application No. 11/382,523. Claims 8-25 stand provisionally rejected under 35 U.S.C. § 101 on the ground of nonstatutory double patenting over Claims 1-20 of copending Application No. 11/382,523.

Applicant requests that these provisional rejections be held in abeyance until claims have been allowed in at least one of the present Application or U.S. Patent Application No. 11/382,523.

CONCLUSION

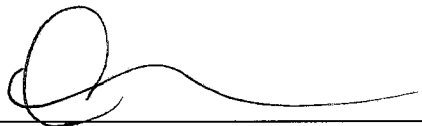
It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: 4/5/07

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